CRES®
CENTER FOR REPRODUCTION OF ENDANGERED SPECIES

REPORT
WINTER 1994

The Park's Lion-tailed Macaques: Nighttime Studies and Surprises

Like humans, monkeys and apes are active during the day. Primatologists have assumed that, like us, they also spend most of their night sleeping. However, a recent series of all-night observations on our lion-tailed macaques revealed a different story.

The night studies were begun in order to determine why infant survival—almost all primates give birth during the night—in our colony had suddenly taken a downturn. Nighttime observations were also used to monitor activities such as composition of sleeping huddles and responses to changes in the weather.

Lion-tailed macaque groups are typically composed of three or four female-headed lineages, or matrilines, each consisting of a founding female and her surviving offspring. Matrilines can include up to four living generations, from great-grandmothers down to great-grandchildren, along with aunts and cousins, all related through the founding matriarch.

Adult males, on the other hand, invariably leave their natal group as adulthood approaches; they eventually take up residence in a group in which they have no female relatives. This is one type of social organization that reduces the possibility of inbreeding. Our Monaco colony has been

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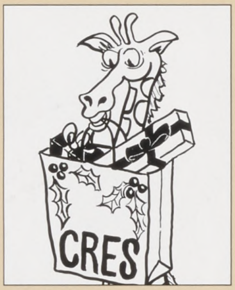
CRES® is operated by the Zoological Society of San Diego.

More Genetic Studies for Przewalski's Horses
Mongolian scientist trains at CRES. See page 3.



CRES "Wish List"
Your donation can help CRES. See page 4.

Adopt a Hippo!
A wild holiday gift idea! See page 5.

The Park's Lion-tailed Macaques: Nighttime Studies and Surprises

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maintained along these natural lines since it was established at the San Diego Wild Animal Park more than 20 years ago. Males born into the group are removed as they reach adulthood and are replaced by unrelated males.

The nighttime studies ruled out cold weather as a factor in infant loss. They also showed that individuals who are related through females prefer to cluster together for sleeping. The major surprise, however, was the discovery of a significant reversal in male-female roles with respect to mating. During the day, the breeding male maintained an almost aloof existence on the periphery of the group. We had assumed that after months of careful observation, we had documented a system in which the estrous female initiated most mating.

Notable in our night records is the frequency with which the male disturbed the sleeping clusters in order to seek out the estrous females for mating. This resulted in numerous spats, breakup of sleep huddles, frequent sleep site relocations, and even play bouts for the immature lion-tails in the middle of the night.

Even more surprising was the distribution of mating behavior over the course of the night. We found high levels of mating from 5:30 to 7:30 P.M., followed by a quiescent period from 8 P.M. to 1 A.M. However, mating behavior started again at 1 A.M. and continued at high levels until 6:30 A.M., when we stopped collecting data.

In addition to the high levels of mating, we observed new behaviors on the part of the breeding male that we had not seen during our daytime observations; these included patrolling and guarding behaviors. Prior to his settling down on a sleep structure for the night, the breeding male would routinely patrol the perimeter of the corral and check all the sleep structures and trees where different members of the group had decided to settle for the night. When there were estrous females in the group, he would sleep either just below them or within a few feet of them, on top of a sleep structure. We called this behavior "guarding," as it allowed him to monitor the coming and going of all animals—especially the subordinate males—during the course of the night.

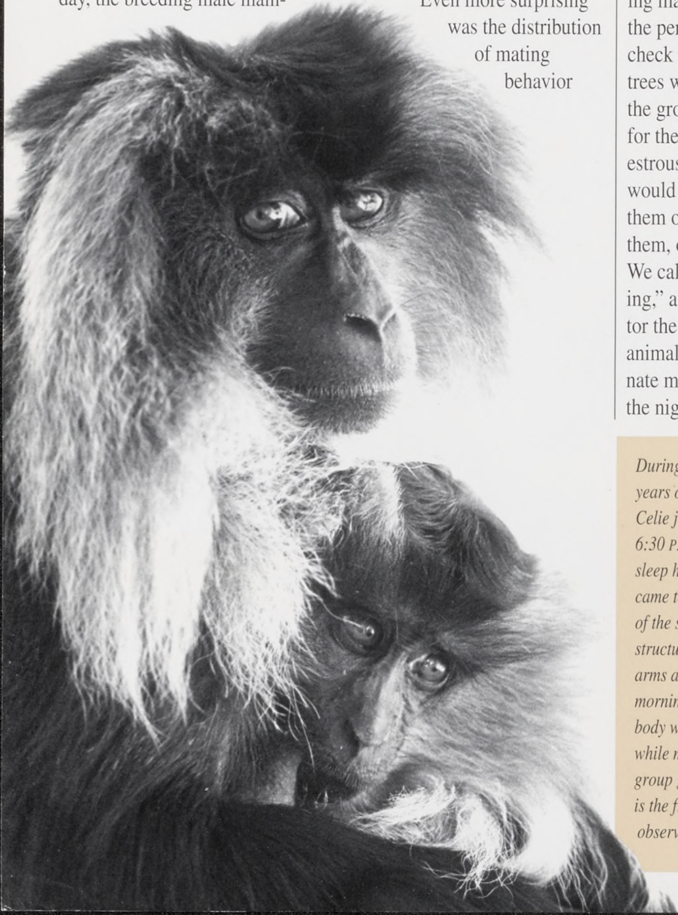
ABOUT THE AUTHORS

***Dr. Donald Lindburg**, head of the CRES behavior division, has been conducting research on the Monaco lion-tails colony since 1983. **Dr. Nancy Harvey**, CRES assistant behaviorist, has been working with the lion-tails since 1988. **Kathy DeFalco** has been the primary observer on the lion-tails since 1990, and without her, information from the nighttime studies would not be possible.*

During those nights when there were no estrous females in the group, the male did not exhibit either patrolling or guarding behavior. We suspect that these behaviors on the part of the dominant male serve to inhibit other males from initiating mating behavior with an estrous female.

Since virtually all our knowledge of monkey and ape behavior in the wild is based on daytime observation, we cannot help but wonder if we have been acquiring the full story by assuming that primates mainly sleep during the night hours!

—Donald G. Lindburg, Ph.D.,
Nancy Harvey, Ph.D., and
Kathy DeFalco



During one of the night watches in March 1994, Celie, who was more than 30 years of age and a great-grandmother, died peacefully in her sleep. As usual, Celie joined her family group that night as they settled down to sleep around 6:30 P.M. About three and one-half hours later, Celie separated herself from the sleep huddle, went down to the ground and laid down. Then the dominant male came to check on her, and she roused herself to move back up to the heated bars of the sleep structure; but she did not join her kin group on top of the sleep structure. About two hours later, it became apparent that she had died, as her arms and legs were no longer tucked up in a normal sleeping position. In the morning, different members of her group repeatedly tried to rouse her. After her body was removed, the group kept moving around the corral and looking for her while making contact "coo" vocalizations. It took about an hour before the group gave up their search and resumed their normal everyday activities. This is the first time that we have seen a lion-tail death occur and were able to observe the animals' reactions to the loss of a family member.

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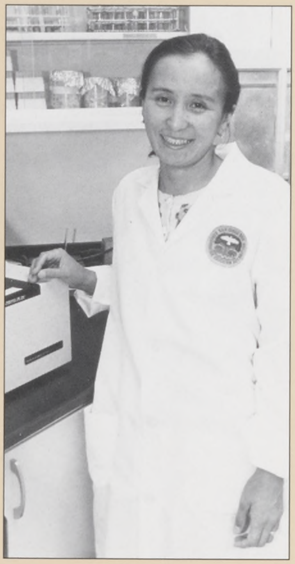
Center For Reproduction Of Endangered Species
Zoological Society of San Diego

Benirschke's pioneering work by preserving cell lines in the Frozen Zoo (a CRES tissue and cell repository) from 385 Przewalski's horses and by correcting studbook data for the species. In collaborative studies with the University of California, Davis, and the Askania Nova Nature Reserve in the Ukraine, 150 Przewalski's horses have had their parentage assignments investigated through blood-typing and DNA analysis. As a result of these studies, significant corrections of the studbook have been made, and changes in breeding combinations for Przewalski's horses in zoos in North America, Europe, and Asia have been implemented. Now that Przewalski's horses have been returned to Mongolia, scientists in that country will want to conduct their own genetic studies in order to maintain the purity of their herds and preserve their genetic diversity.

GUN-AAJAVYN BAYARMAA

Visiting Scientist from Mongolia at CRES

Gun-Aajavyn Bayarmaa of the Institute of Biotechnology, Mongolian Academy of Sciences, Ulan Bator, Mongolia, is presently receiving training in the CRES genetics laboratories under the supervision of Dr. Oliver Ryder and his staff of specialists. Bayarmaa was selected by the Academy to participate in a four-month exchange program (September-December 1994) sponsored by the International Research & Exchange Board, Washington, D.C. Bayarmaa's initial field of specialization was physics, and she was on the faculty of Kharkov University, Ukraine, from 1984-1989. At CRES, Bayarmaa is learning molecular genetic techniques, including PCR amplification and DNA sequencing. Additionally, she is learning cytogenetic techniques and how to establish a frozen zoo in Mongolia. At the end of December, Bayarmaa will return to Mongolia, where she can begin to implement techniques of molecular genetics analysis learned at CRES that will be useful for monitoring the genetic health of Przewalski's horses and other species in Mongolia.



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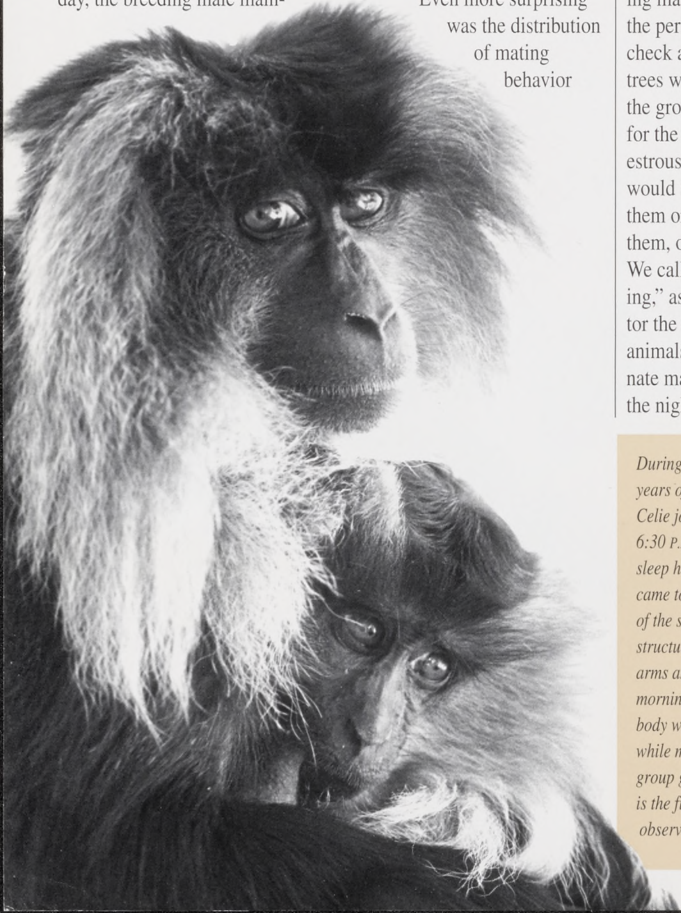

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Enclosed please find my gift in support of
the Endowment Fund for the San Diego Zoo's
Center for Reproduction of Endangered Species (CRES).
I understand my gift to the endowment will
provide revenue for ongoing conservation
and research programs in perpetuity.

Please make checks payable to:
Zoological Society of San Diego/CRES

☐ $20 ☐ $50 ☐ $100 ☐ $1,000* ☐ $

☐ MasterCard ☐ VISA ☐ Discover Signature:

Account Number: Expire Date:

Name: (Dr., Mr., Mrs., Ms.)

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* Friends who become CRES Ambassadors at the $1,000 level will have their name inscribed on a beautiful CRES Conservation Plaque, placed at the San Diego Zoo.

Please print name exactly as you want it to appear:

Please indicate if this name is: ☐ in memory of ☐ in honor of a family member or loved one.

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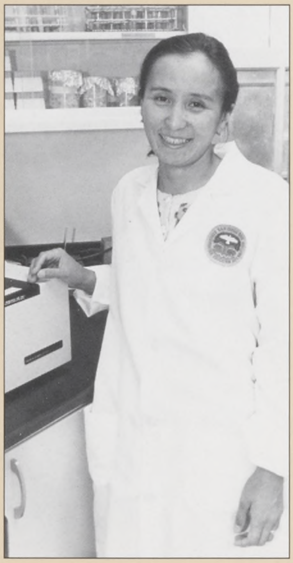

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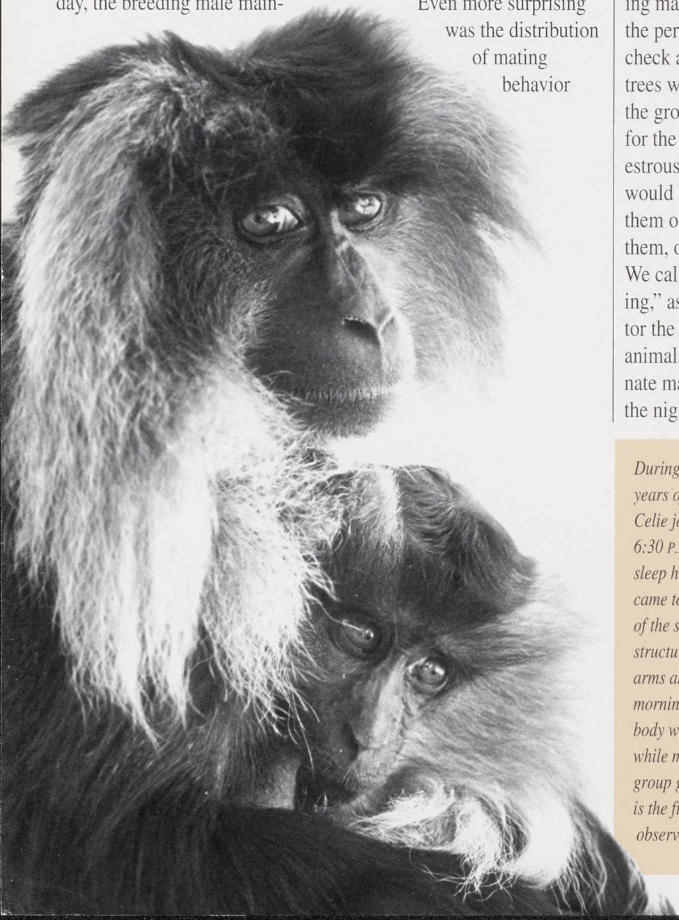

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San Diego, California 92112-9966

Place
stamp
here

Genetics

CRES geneticist Dr. Oliver Ryder has had a longstanding interest in the genetics and management of Przewalski's horses. For 15 years, he served as SSP Species Coordinator for the Przewalski's horse. He continues his role internationally on the Steering Committee of the Przewalski's Horse Global Management Plan Working Group, as well as through his involvement with the Mongolian Academy of Sciences in genetic studies of Przewalski's horses and other equids. CRES founder Dr. Kurt Benirschke first described the chromosomes of Przewalski's horse and noted that this endangered species had 66 chromosomes, whereas all domestic horses have 64. Dr. Ryder extended Dr. Benirschke's pioneering work by preserving cell lines in the Frozen Zoo (a CRES tissue and cell repository) from 385 Przewalski's horses and by correcting studbook data for the species. In collaborative studies with the University of California, Davis, and the Askania Nova Nature Reserve in the Ukraine, 150 Przewalski's horses have had their parentage assignments investigated through blood-typing and DNA analysis. As a result of these studies, significant corrections of the studbook have been made, and changes in breeding combinations for Przewalski's horses in zoos in North America, Europe, and Asia have been implemented. Now that Przewalski's horses have been returned to Mongolia, scientists in that country will want to conduct their own genetic studies in order to maintain the purity of their herds and preserve their genetic diversity.

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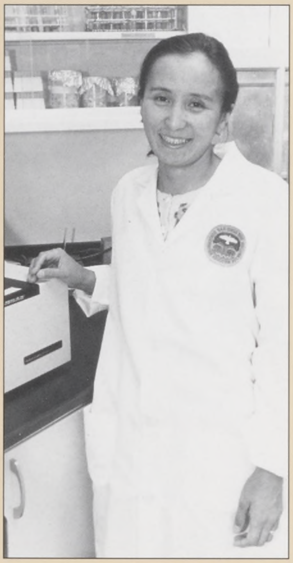

1994 CRES "Wish List"

Every organization has a "wish list"—the specialized equipment needed for projects that a budget cannot always cover but that generous friends make possible by their donations. At CRES, with more than 30 ongoing research projects worldwide that focus on endangered species, there is always a need for very special equipment and supplies. The equipment name may be obscure—such as the oligonucleotide synthesizer!—but the need is great. Your donation will help the staff at CRES in their race to save wildlife species from extinction.

- Oligonucleotide synthesizer - $19,000
  This machine would allow several divisions to rapidly produce oligonucleotide primers for use in PCR and DNA sequencing. Currently, these primers are commercially prepared and this causes delay between experiments.
- Rotary vacuum, Savant Instruments DNA Speedvac Model 110 - $5,500
  This piece of equipment rapidly dries DNA samples. When DNA samples are air-dried, this slows all procedures involving use of DNA.
- CO_2 incubators (4 needed) - $8,000 for one.
  The double-door CO_2 incubators at CRES do not function precisely and only limited work can be accomplished with these units.
- Zeiss inverted microscope - $4,600
  This is very much needed as the infectious diseases division has only a single, outdated microscope in its area.
- Vacuum gel dryer, Hoefer #SE 1175 - $3,000
  CRES has only one gel dryer system. The work load for this machine is far greater than can be accommodated.
- Automated DNA sequencer, Pharmacia ALF 18-1004-S1 - $81,000
  This piece of equipment allows rapid sequencing of DNA, which is currently accomplished manually. The large increase in volume of material for which DNA sequencing is needed makes this piece of equipment a necessity.
- PCR thermal cycler, Perkin Elmer/ Applied Biosystems - $6,700
  CRES staff have successfully applied the new PCR technique to the diagnosis of clinical disease and detection of carrier animals within the Society's collections. A thermal cycler like this automates the steps required to use this technique and is essential for reproducibility of assay conditions.

Jim McConlogue

CRES Grants and Donors

CRES is pleased to recognize the following for their role in protecting endangered species from extinction:

An ***anonymous donor*** *has made a generous grant to improve reproductive success in the critically endangered black rhinoceros. Funding will permit CRES endocrinologist Nancy Czekala to monitor and evaluate hormone levels in free-ranging and captive black rhino populations.*

The ***John and Beverly Stauffer Foundation*** *has completed a grant for continued support of CRES geneticist Dr. Oliver Ryder's work on the reintroduction of the Przewalski's horse to its native Mongolian habitat. Extinct in the wild since 1970, Przewalski's horse has been repopulated in captivity in a global preservation effort.*

Adopt a Hippo!

It's easy and fun to adopt! The animal lover you love is sure to be delighted when they find this unique gift under the tree:

- **A cuddly, plush hippo of their very own**
- **A handsome adoption certificate**
- **Two complimentary guest passes to the San Diego Zoo or San Diego Wild Animal Park**
- **A subscription to *CRES Report***
- **A special gift card to announce your gift adoption.**

And . . . the knowledge that your contribution will help us help the many endangered species at the San Diego Zoo and the San Diego Wild Animal Park.

Why not share a special Holiday Season with someone you love by adopting a hippo!

Animal adoptions are a great way to celebrate with our family and friends all year long.

- **Why not ring in the New Year with a ring-tailed lemur!**
- **Give that special someone a Valentine's gift they'll be wild about!**
- **Brighten someone's birthday with a sun bear or a rainbow lorikeet!**

NOTE: Naturally, your adopted hippo will remain at the Zoo or the Wild Animal Park in the care of our professional staff. Please be aware that the lives of animals for adoption are subject to unavoidable changes. For that reason, adoptions are offered by species only, not by individual animal.

* Special adoption rate good through December 31, 1994.

*Special Adoption Rate $99**

ANIMAL ADOPTION APPLICATION

☐ **YES,** I want to adopt a hippo as a gift for:

Name(s) ______________________________

Address ______________________________

City __________________ State ____ Zip ________

Please sign the special card announcing my gift adoption as follows:

____

Name(s) ______________________________

Address ______________________________

City __________________ State ____ Zip ________

Phone (day) ______________ (evening) ______________

Member Number ____________________________

☐ Also, please enter my own adoption for a hippo at the special rate of $99 for one year.

Please make checks payable to the Zoological Society of San Diego and mail to:

The Zoological Society of San Diego
Adopt-An-Animal Program
P.O. Box 271
San Diego, CA 92112

Or, to charge your adoption by telephone, call (619) 557-3974 between 8:30 A.M. and 4 P.M., Monday through Friday. Orders must reach the San Diego Zoo by December 16th to ensure delivery by Christmas.

☐ Please check here if you'd like more information about our Adopt-An-Animal Program.

(AHCR4)

Happy Hippo Holidays!

'Twas the night before Christmas,
when all through the Zoo
Not a creature was stirring,
not even a gnu.

Each lory and parakeet was
snug in its nest;
Every bear, frog, and hippo
was enjoying a rest.

For the Holidays, as always—
each day of the year,
All the animals wish you
good tidings and cheer.

And to share all that joy with
your friends far and near,
With each someone special
that you hold so dear,

Adopt an Animal, or two,
or three…
It's the perfect gift to go
under their tree!

Happy Holidays from Your Friends at the Zoo!

Smash, Stash, and Cash for CRES!

What CAN you do to help save endangered animals? It's simple: you CAN smash, stash, and cash aluminum cans for CRES! Join the many schools, organizations, and individual collectors as they go "can crazy" for the Cans for Critters recycling program. Over the years, can collectors have saved and redeemed thousands of aluminum cans and other recyclables, with the proceeds designated to benefit CRES.

The Cans for Critters recycling program is an easy, educational, and environmentally helpful way to make a difference in the future of our endangered wildlife. Participants learn the importance of conservation while earning fun prizes like pencils, animal nature pogs, and Godfather's Pizza coupons. Your organization may even receive a visit from a San Diego Zoo furry or feathered animal pal! But the fun doesn't end there! All top can collectors are invited to celebrate the end of each drive at a special Cans for Critters Jamboree award assembly at the Zoo.

With the successful completion of the fall drive, dedicated CRES "canners" have already begun smashing and stashing for the spring drive in 1995! To learn more about the Cans for Critters program, please call Kim Jordan at the Zoo's development office at (619) 685-3272.

Tammy Batson, San Diego Zoo keeper (left), and Priscilla the porcupine encourage students to recycle for CRES.

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CENTER FOR REPRODUCTION OF ENDANGERED SPECIES

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Warner Design Associates, Inc.

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SAN DIEGO ZOO · SAN DIEGO WILD ANIMAL PARK

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Post Office Box 551
San Diego, California 92112

C·R·E·S REPORT
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